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Agriculture conservation role of moisture and soil organic matter semi-arid

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Abstract
The uncertainty in rainfall semi-arid regions and their need for annual water negatively affects production and grain yield. These characteristics are obstacle rapid changes in the varieties range or cropping systems to cope with climate changes. Soil loss is very advanced by different erosion. These phenomena are exacerbated by production systems (monoculture cereal and fallow) and methods and tools used tillage (plowing and recrossing). The wait for rains to begin initial work of soil is necessary. This leads them to significantly reduce period of crop growth, already reduced in recent years because of climate change, including drought and global warming. The performance impacts direct seeding techniques' are discussed in turn, through the tests conducted in the region results. We will proceed to soil parameters study such as moisture and organic matter and crop yield parameters (wheat grain yield). Simplified work studies on cereal crops are beginning to draw tracks and paths for more research to understand why not to integrate this system on the farm friendly vis-à-vis natural resources.

Key words: conservation agriculture, humidity, organic matter, grain, semi-arid performance.

I. Introduction

In climate change context, cereal is relatively vulnerable because certain characteristics, both physiological and socio-economic [1]. Rainfall agriculture uncertain in semi-arid and arid and need annual water negatively affects production and grain yield. In Algeria, climatology rather thankless leading grain producers to adopt biennial rotation and observed strictly. However, desire to ensure fodder supply and livestock grazing that is retained stubble (cereal, etc.) backwards then work land. This production system has long practiced a significantly limit diversity in semi-arid areas. In agriculture, biodiversity functioned as relationships with agricultural activities described resistance to biotic and a biotic stresses, and cultivated ecosystems production.

Conservation agriculture or vegetation planting commonly referred to as direct seeding techniques practiced based on a massive scale in North America and South America, can be a way to expand diversity. Direct seeding interested mechanized agriculture, subject to strong weather conditions, where relief's on water conservation and soil is a priority and generates heavy investments, such as Maghreb countries [2]. It is practiced in agriculture to better manage storm rainfall by improving water availability during cycle life of plant economic question. Direct seeding advantage is expressed differently depending on the area or site within the zone and the year of culture [3]. The agronomic benefits of direct seeding are numerous, with better infiltration and improved water storage, better performance components, greater tendency change and control plants, with production are differences in its favor, improving soil structure, improved porosity, an increased

organic matter rate, better root culture establishment, reduction of changes in soil temperature. Among environmental benefits are cited: fight against erosion, increasing biodiversity, carbon sequestration, improved water quality and sediment in rivers reduction, lakes... and reduced costs [4]; [5]; [6]. The best no-till systems produce between 26 and 32 t / ha / year of residue dry matter [7].
Decision to apply this work system must be taken when harvesting previous crop, since straw handling and other plant residues is fundamental to bring to fruition. Cereal's production system/ sheep adopted in semi-arid regions leaves straw management often in animal favor, which leaves soil lacking in crop residues before tillage, whatever period and tillage type.
However, direct seeding technique hertz constraints dimensions varied techniques, psychology, traditions such as greater involvement of the farmer, a change in mentality, technical knowledge lack and technical management of the period transition (several years). Psychological aspect is an important factor in farmers' commitment.
Goal through this work is to better understand a tillage effect on soil moisture and organic matter on one hand and crop yield parameters as rate survey, weed infestation and grain wheat yield on other.

2. Materials and methods

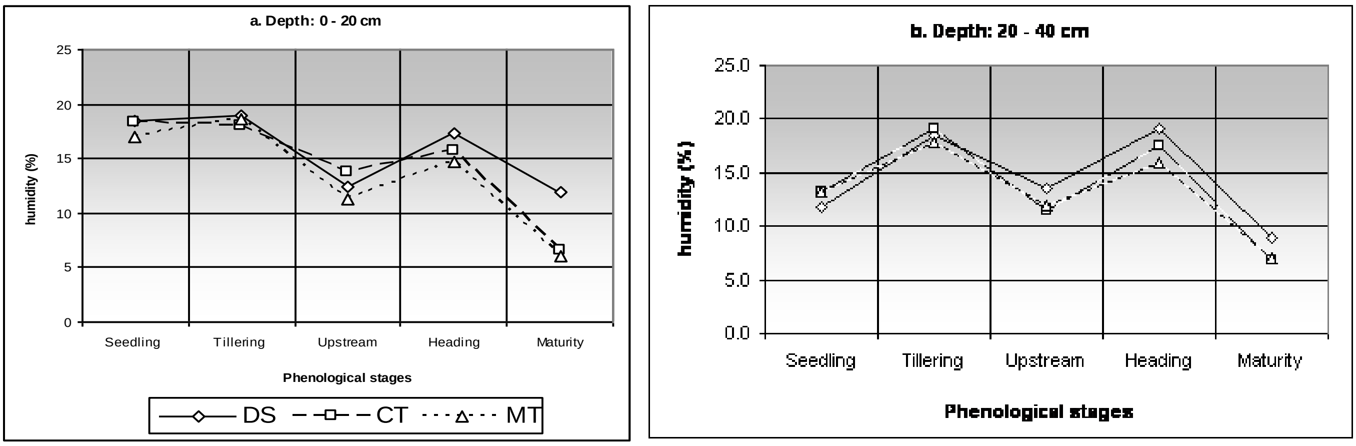
Experimental study concerns rainfall north-east areas of Algeria, under a semi-arid continental. Dominant fact is great variability and rainfall irregularity according to North-South gradient in rainfall agriculture area. Site is also characterized by very frequent spring frosts and drying winds and hot end of cereal cycle [8].
Average annual rainfall in Setif region is from 200 mm to 450 mm at south to north. Differences in distribution rainfall time and space throughout region require that farming operations, especially date and seed rate and any nitrogen fertilizer is not standardized. These operations must be carried out while respecting deficit water periods and active vegetative growth, grains can travel to reach maximum yields. Rainfall during the 2008/ 09 companions, from September to June inclusive, amounted to 372.9 mm with a rainy winter. These annual rainfall compared to the two key periods in the cereal, winter and spring period ranged respectively in the medium (207.2 mm) (121.4 mm). The inter-monthly rainfall variation was greater for second period (CV = 60%) than that of the first period (CV = 35%). Between these two seasons are distinguished: (i) a winter's lowest temperature in January, the average temperature is 8.45 ° C. And (ii) a hot season from May, the average temperature is 21.8 °c.
Soil is particularly strong in northern clay-loam and silty clay with a high percentage of limestone at plateau (central and southern region). The soil site features a textured surface horizon clay loam (42% clay, 44% silt, 13% sand and 2.5% organic matter). This composition gives them a coherent structure and sensitivity to winter rainfall and the capping risk is very low. Tillage requires a traction means, because of the loose silt. However, the period during which it is possible to tillage is short.
The experiment was conducted during the crop years 2008 / 2009 and 2009 / 2010 in the Setif region, in one situation of soil, rainfall and topography, at a 1081 m altitude.
Tillage techniques comparison has involved three types: (1) direct seeding (DS) without working soil, (2) simplified cultural tillage (SCT): a single chisel pass and (3) conventional tillage (CT) with a dominant cereal mechanized plowing and backcrossing. Tools used for conventional tillage are: moldboard plow, cover-crop to reduce lumps. Study focused on a species by grain durum wheat; Waha is the variety, originally from Syria, is an early variety, and enhanced by ICARDA is designed to dry areas. Waha variety is characterized by its earliness, semi-dwarf and an extended half-grain [9]; [10]. For trials installation, two drills types were used, Drill SOLA for conventional tillage installation and minimum tillage and planter type SEMEATO for direct seeding. Direct seeding seeder, specialized, is designed to spread through residue, stirring soil as little as possible,

with hard and heavy weight to determine biomass. Experiment was in its third year, on precedents: fallow uncultivated, preceded by cereal cropping conventional tillage and simplified work and cereal (barley/ wheat) for direct seeding. Observations were for an experimental block factorial simple three repetitions.

3. Results and discussion

3.1. Profile soil water

The results shown by the evolution curves of soil moisture in the three tillage technologies show differences in profile soil water compared to physiological stages and soil depth (Fig. 1).
Compared with soil depth at growth cycle beginning seed stage), humidity was higher in a depth (0-20 cm) with an average of 18% against 12% in the depth 2 (20 -40 cm). At growing season end, at heading stage, humidity is 16% in depth and a slightly increased to 17.5% with depth 2. Mature stage, moisture has fallen to 8% for both horizons 1 and 2.
Compared to tillage technology, conventional tillage resulted in early stage (seed stage) on average a high relative humidity, respectively, compared to minimum tillage and direct seeding (Fig. 1). This difference was significantly higher in depth 2, which clearly shows that at cycle beginning, work has allowed conventional water storage faster compared to minimum tillage and direct seeding. On contrary, at cereal growth cycle end, we find direct seeding keeps humidity higher (9%) compared with minimum tillage (7.1%) and conventional tillage (6.8 %). This trend is valid for both soil depths. This variation in soil moisture from soil depth interaction and technology work is due to several effects among which emphasizes direct seeding role on create, maintain and preserve good soil structure in any cultural profile [11]. According to several authors [12]; [11], conservation techniques based on direct seeding increases moisture in soil profile compared to conventional tillage. At cycle beginning, soil surface conditions, conventional tillage presents hydrodynamic characteristics more favorable to rainwater absorption. Also, direct seeding can have this ability especially after sowing and opening of grooves with seed drill. However, in a final cycle, water losses remain high in conventional tillage by fact that ground is more open and exposed to vapor-transpiration by appearing in no-tillage (direct seeding). Deep tillage can increase soil permeability and soil evaporation, for against; direct seeding has a role to trap water for future plant needs in maintaining soil structure. In addition, no-till allows crop residue to accumulate on soil surface and also a "mulch" formation and reduced evaporation.



Legends: Direct seeding**,** CT: Conventional tillage, MW: Minimum tillage

Figure 1: Changes moisture content rate in soil

3.2. Organic matter
In first horizon (0-20 cm), direct seeding (DS) has highest value: 3.39% > CT: 2.74% > MW: 1.76%. What it allows us to say at this level and direct seeding, organic matter is more abundant on surface from depth by fact that residues remain on the surface. In second horizon (20-40 cm), direct seeding gave highest value: DS: 3.04% > CT: 2.60% > MT: 2.24%. This is cereal's residues that are enfeebling superficially superficial ways. Conventional tillage allows organic matter burial deep. And finally, a uniform organic matter content due to tillage.

3.3. Settlement Density (plants/ m²)
Variance Analysis revealed a highly significant difference between different cultivation techniques (DS, CT and MW), with a 9.89% coefficient correlation. Population average density of test raises 235 plants/m² from target density (300 plants/ m²) for a difference of 65 plants/ m² (22%). Average population density ranking per technique revealed three homogeneous groups with a standard deviation of 23.21%. Areas planted in direct seeding (SD) have a higher density (285 plants/m²) or a loss of 5% compared to target density, while those of conventional tillage (TC) and minimum tillage (MT) are respectively 239 feet / 180 square meters and feet /m², or a loss of 61 to 120 feet /m ² (20% and 40%) compared to density question.
It was noted generally, emerged plants number is often less than seeds sown number, and this is largely due to several factors, some specific to seed and backgrounds but others are technical. Often technical factors are often overlooked or mastered male crops out such introduction as state seed bed, seeding depth... [13]. Often interaction result between tillage and climatic conditions that are often at odds with seed installation requirements. Loss in density, recorded in conventional tillage was mainly due to seeds location in relation to optimum depth. Record large presence seeding clumps is becoming an online broadcast seeding. However, in minimum tillage case, plant population was affected by presence of much higher weed debris decomposed male who probably has a negative impact on cereal lifting.

3.4. Weed infestation
Overall, total feet numbers in treatment direct seeding (DS) is 6 feet/ m², or 31% compared to all treatments average (19 feet/ m²). On direct seeding (DS), there were a few feet of wild oats and Verona. For cons, feet counted average number in other two treatments are: 22 feet/ m² (or 105% compared to total average of all treatments) in conventional tillage, which includes several cereals weeds species. A minimum tillage, weeds spread in plots is simply higher, there were 30 plants/ m² (or 158% compared all treatments average) with a high species cereals weeds number. What constitutes a real risk to cereal, given tough competition between crop plants and weeds. Most dominant species are: barley, brome, biker field...), Table 1.
Weed infestation noticed high in labor or minimum cultivation techniques simplify is mainly due to chemical treatment absence and tillage lack. Here we recall that test was conducted for this third consecutive year in same plots with previous crop barley / wheat which has increased weeds presence, even if reduced diversity of views (this is due to long-rotation lack).
For conventional tillage, deep plowing role allows weed seeds burial, too, backcrossing role and harrowing allowed latter destruction [14]. But apparently significant rainfall in region known in post exercise allowed weed seeds stored germination in soil. As for till, it was noted that planting and weeding post office has risen proper weeds cleaning. But it tends to change flora, encouraging broadleaf weeds (*Veronica arvensis*) and grasses (wild oats). This diversity recorded in low-till is due probably to fact that rotation is reduced (cereals / grains: barley). According to several authors, direct seeding tends to change flora, favoring grasses and broadleaf weeds (but on longer rotations).

Table 1: infestation by weeds per treatment.

Weeds		Technology tillage		
Families	**Species**	**DS**	**CT**	**Mt**
Grasses	Barley		*	***
	Bromine (*Bromus*)			**
	wild oats	*		
Legumes	*Medicago sp*			**
Cruciferae	*Diplo taxis*		*	**
	Biker field			**
Umbelliferae	*Bifora radians*		**	
Asteraceae	*Calendula, sanchisse*			*
	Blue thistle			**
Resedaceae	*Resedu lutea*			**
Papaveraceae	*Papaver (Poppy)*		*	**
Fumariaceae	*Fumitory*		**	
Scrophulariacea e	*Veronica arvensis L.*	**	**	
Euphorbiaceae	*Euphorbia exiga*		**	
Convolvulaceae	*Convolvulus arvensis*			**

Legends: (DS): Direct seeding**,** CT: Conventional tillage, MW: Minimum tillage**, (*)**: little, **(**):** enough, **(***)**: high

3.5. Root length

Analysis variance results for root length indicate that cultural practices influence very highly significant at 5% with a CV of 16.88%. There is a 9.8 cm average depth with 1.7 cm a standard deviation, two homogeneous groups were observed: First group is only 14.8 cm with conventional tillage and second group are minimum tillage (6.5 cm) and no-till (8.18 cm), fig 2. These results highlighted conventional tillage importance particularly beyond 25 cm, which allowed a good tithe of soil underlying layer, layer exploited by the roots. Deep tillage positively influences root system depth growth.

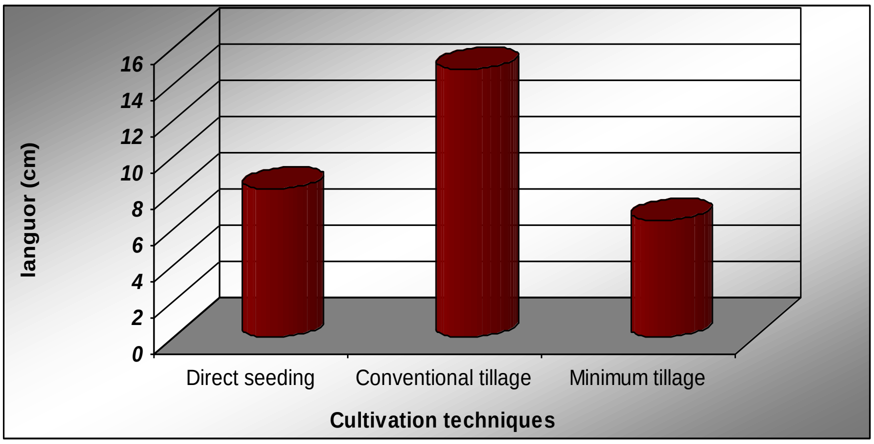


Figure 2: Cultivation techniques effect on the languid roots average

3.6. Ears Number per m²

Ears / m² number variance analysis was detected highly significant differences between different cultivation techniques and with a 9% variation coefficient. Ears per square meter average number ranking gives three homogeneous groups. Direct seeding (DS) has a higher ears (346 ears / m²) number, followed respectively by conventional tillage (CT) (280 ears / m²) and minimum tillage (MT) (216 ears / m) (figure 3) with a standard deviation of 18.1%. Ears number of is influenced by density of that exercise was higher in SD compared to conventional tillage and minimum tillage as well as soiling degree in weeds, which reflects minimum tillage plots state situation, which affected spikes number by reducing tillers spikes number.

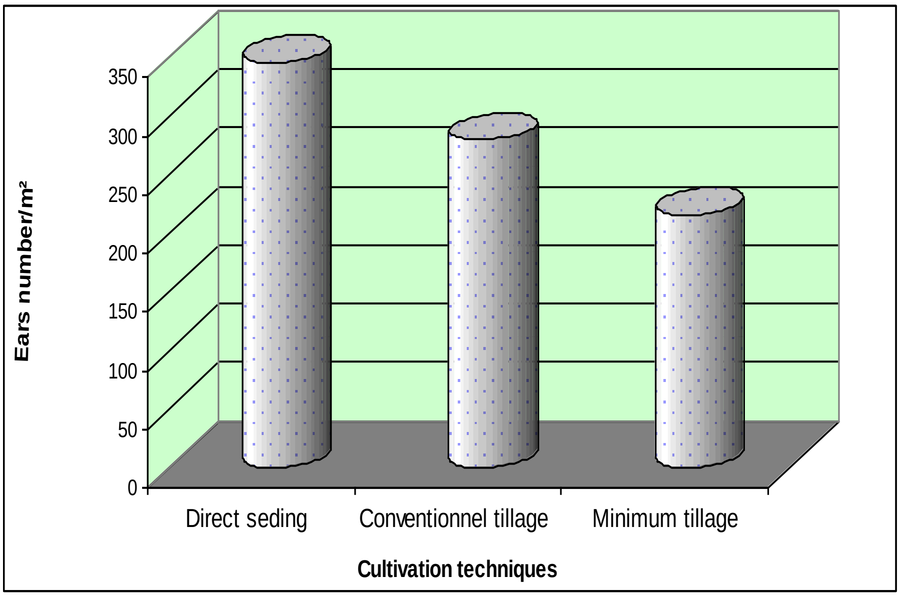


Figure 3: Cultivation technique effect on the ears / m² number.

3.7. Final grain yield

Final grains yield variance analysis results, expressed in quintals per hectare, show very highly significant differences between three cultivation techniques with an 11.76% variation coefficient, Table 2. Cultivation techniques were characterized by three homogeneous groups led by direct seeding (19.9 q / ha) followed by conventional tillage (17.9 q / ha) and finally, minimum tillage that has characterized lowest yield of 10.5 q/ ha (Figure 6). We can say that it is same tendency found by [15], yield: 20 quintals as against 12 quintals in 2002, against 54 quintals and 58 quintals in 2003. The difference (especially in dry years) is due to grains per ear number and 1000 kernel weight.

Table 2: final grain yield statistical analysis.

Technology tillage			Average	Difference -type	Prob. F1	V.C. %
Conventional tillage	Minimum tillage	Direct seeding				
17,9	**10,5**	**19,9**	**16,1**	**4,95**	0,0000	11,76 %

3.8. Straw yield (stem biomass)

Values obtained show that direct seeding techniques gives a straw yield amounting to 58.5 q / ha, and is higher than those obtained in other techniques: minimum tillage and conventional tillage with respective yields of 44.8 q / ha and 29.5 q / ha. Straw yield is mainly related to exercise density, stems average height and tillers herbaceous number. This confirms previous results by [11]; [16]; [17].

Conclusion

Direct seeding is a cultivation technique that requires more monitoring and weeds control, pests and diseases than conventional tillage. Direct seeding favors increase of water balance essentially at cycle end or grain maturity where cereal crops needs are higher than conventional tillage.

Yield is higher on the plots as the SD plots of TC and TM. Gain in performance seems mainly to a density of plants/ ha slightly higher and above a grains/ foot number higher. What added a slightly higher grain weight and grains per ear number. This is probably mulching effect on water (more infiltration, less evaporation), which has reduced water stress, a longer wheat cycle and ultimately have a better performance.

Tillage effect on weed restriction is also confirmed as part of sub-parts-till were less grass than subparts witnesses and on other hand weeding seem work to have parties was facilitated direct seeding, using a weeding post seedlings.

Agronomic mulching value for wheat plots in semi-arid regions is confirmed and worth pursuing. It remains to refine route for technical failures or even fewer, better training and supervision to farmers they are able to fly in most technically and economically this new route.

To use this technique, although it will take into account proper waste management, to be begun in previous crop.

Till, in addition to its benefits in reducing evaporation, can well calibrate cereal cycle. It also allows culture to enjoy first year rains and to escape drought at cycle end. Direct seeding purpose or application is to mitigate some effects caused global warming.

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